USER MANUAL

RA00183

90750

BRUSHLESS + BRUSHED
over 3T (brushless - star)
over 4T (brushed)

matrix ISTC evolution

for distributor address see packaging

www.nosram.com

Dear Customer,

thank you for your trust in this NOSRAM product. By purchasing a NOSRAM MATRIX EVOLUTION ISTC Brushless+Brushed speed-control, you have chosen one of the most advanced speed-controls of today. This speed-control with all of its high-tech features and specially selected electronic components is one of the best speed-controls for Touringcars currently available on the market.

- Optimized XPS.2 software
- Forward/Brake
- Automatic Brushless/Brushed adaption
- Launch Control
- 4, 5 and 6 cell optimized
- Special TC software
- Low profile heatsink with integrated fan
- Smart-Temp-Readout-System
- Redesigned brake
- Large Power capacitor

Please read the following instructions to ensure, that your NOSRAM MATRIX EVOLUTION ISTC Brushless+Brushed speed-control always works up to your full satisfaction.

Please read and understand these instructions completely before you use this product!
With operating this product, you accept the NOSRAM warranty terms.

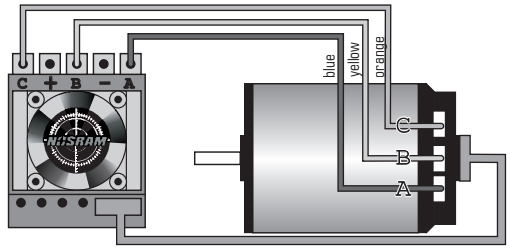
1. INSTALLATION

The NOSRAM MATRIX EVOLUTION ISTC is supplied with 12AWG power-wires without connectors. Be very careful with the correct wire sequence/colors since an incorrect connection may damage the speed-control! Avoid creating solder bridges on the solder-tabs and isolate all connections carefully.

Caution: Avoid soldering longer then 5sec per soldering joint when replacing the power wires on the speed-control and motor to prevent possible damage due to overheating of the components!

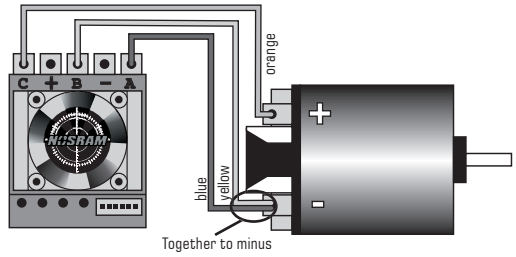
- Connect the speed-control to the receiver (position: Channel 2)

BRUSHLESS MOTOR:
- Blue power-wire ➔ Speedo MOT.A to motor „A“
- Yellow power-wire ➔ Speedo MOT.B to motor „B“
- Orange power-wire ➔ Speedo MOT.C to motor „C“
- Connect the hall sensor cable to the speed-control and the motor.



Hall Sensor Wire

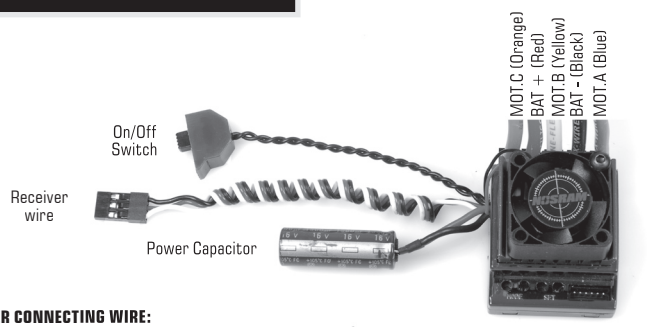
BRUSHED MOTOR:
- Blue/Yellow power-wire ➔ Speedo MOT.A/MOT.B to „Minus“ on the motor.
- Orange power-wire ➔ Speedo MOT.C to „Plus“ on the motor.



Together to minus

- Doublecheck all connections before connecting the speed-control to a battery.
  CAUTION: If battery is connected with reversed polarity it will destroy your speed-control!
- Red power-wire ➔ Speedo BAT+ to battery „Plus“
- Black power-wire ➔ Speedo BAT- to battery „Minus“
- The speed-control is now ready to be set-up (see section 6).

2. CONNECTIONS



RECEIVER CONNECTING WIRE:
This NOSRAM speed-control is equipped with an NOSRAM Multicon receiver wire. As supplied, it will easily fit in all ordinary receivers.

HALL SENSOR WIRE:
This bi-directional multipole wire (which comes with the motor and NOT the speed-control!) connects the speed-control and the motor. Do not alter or modify this cable! There are replaceable/optional hall sensor wires available: • #92510 (20cm) • #92520 (10cm)

POWER WIRES:
For maximum performance, 12AWG power wires without any connectors are used. The unique splitted solder-tabs allow easy and convenient replacement of the power wires. Nevertheless some soldering skills are required. Avoid soldering longer then 5sec per soldering joint to prevent possible damage to the speed-control due to overheating of the components! There is a full 12awg replacement power wire set available: #92506

3. SPECIFICATIONS

Brushless + Brushed	yes	Voltage Input	4.8-7.4V
Brushless + Brushed Adaption	AUTOMATIC	Weight (excl. wires)	45.0g
Forward/Reverse	yes	B.E.C.	5.8V/3.0A
Case Size	33.1x37.6x32.5mm	High Frequency	yes
Typ. Voltage Drop (Brushless)* @20A	0.017V / phase	Sensored Brushless System	yes
Rated Current (Brushless)*	400A / phase	Multi-Protection-System	yes
Compatible winding styles (Brushless)	Star	Power Wires	12awg silicone flex
Rec. Motor Limit for Star winds (Brushless)**	over 3 turns	4, 5, 6 cell optimised	yes
Typ. Voltage Drop (Brushed)* @20A	0.012V	Smart-Temp-Readout-System	yes
Rec. Motor Limit (Brushed)**	over 4 turns	Launch Control	yes
Rated Current (Brushed)*	400A	Integrated heatsink + fan	yes
4 adjustable Modes (NiMH/LiPo, XPS.2/PMS.2 Power Profiles, Initial- and Automaticbrake)			yes

* Transistors rating at 25°C junction temperature
** measured at 7.2V

Specifications subject to change without notice.

4. INSTALLATION TIPS

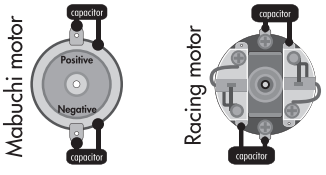
- Mount the speedo using the supplied thick/black doubled-sided tape.
- Position the speed-control where it is protected in the event of a crash.
- Install the speed-control so that you have easy access to the connector and buttons.
- Make sure there is enough clearance (about 3cm) between the speed-control, power-wires, antenna and receiver. Avoid any direct contact between power components, the receiver or the antenna. This can cause interference. If interference occurs, position the components at a different place in the model.
- The aerial should be run vertically up and away from the receiver. Avoid contact with any parts made of carbon fibre or metal. If the aerial is too long, don't coil up the excess length. It is better to cut it down to a length of about 35 cm. See also the instructions supplied with your radio control system.
- Make sure there are enough cooling slits in the body. This will increase the performance and life of all the electronic components.

HEATSINK: To achieve best perfomance even under extreme conditions, the heatsink has been directly mounted to the speed-control. This ensures the best possible heat transfer away from the speed-control.
Caution: Never attempt to remove the heatsink, because the speed-control will get damaged if you do this. The heatsink is an integral part of the speed-control and therefore cannot be removed.

Because of the physical principles of brushless technology, the speed-controls do get a little hotter then brushed systems. Therefore it is required to let the speed-control cool down completely after every run.

Mount the power-capacitor in a position where it is protected in the event of a crash. The best place is right next to the speed-control (see picture). Secure it with doublesided tape.

5. SUPPRESSION



ONLY FOR BRUSHED MOTORS! Motors with no capacitors or not enough capacitors may interfere with the speed-control. To avoid this, solder the supplied capacitors to your motor (see picture).

6. RADIO / SPEED-CONTROL SET-UP

In setup mode the NOSRAM MATRIX EVOLUTION ISTC stores every step when you press the SET button. All the settings will be stored in the speed-controls memory even if the speed-control will be disconnected from the battery.

TRANSMITTER SETTINGS
Setup the following basic functions on your transmitter (if available):

Throttle travel	High ATV, EPA	maximum
Brake travel	Low ATV, EPA, ATL	maximum
Throttle exponential	EXP, EXPO	start with 0
Neutral trim	SUB Trim	centre
Servo reverse	Throttle reverse	any setting, don't change after set-up procedure!

If your transmitter doesn't offer any of above functions, it's already in „basic setup" mode.

- Ensure that the speed-control is not connected to the drive battery and is switched off.
- Remove motor pinion or ensure that the wheels of the model are free to rotate.
- Switch the transmitter on and set the transmitter throttle stick to neutral.

- Connect the speed-control to the battery, and switch the unit on.
- Hold the SET button pressed for at least 3sec using the supplied plastic screwdriver.
  ➔ You entered setup mode and the SET LED flashes blue (it will flash until the setup is completed).

- Leave transmitter in neutral position and press the SET button once.
  ➔ Neutral setting is stored , MODE LED flashes yellow and the motor beeps.
- Hold full throttle on transmitter and press the SET button once.
  ➔ Full-throttle setting is stored, MODE LED flashes red.
- Hold full brake on transmitter and press the SET button once.
  ➔ Brake setting is stored, LED's glow red (MODE) and blue (SET).

- This completes the setup procedure and your NOSRAM MATRIX EVOLUTION ISTC is ready to use.
- If you make a mistake during the setup procedure, don't worry: Disconnect the battery for about 10sec and start again from the first step.
- At the end of each run switch of the car, and then switch off the transmitter.
- At the start of each run switch on the transmitter first, then switch on the car.
- For storage of the car, disconnect the drive battery at any time!

CHECKING THE FUNCTIONS:
Check the LED's when moving your throttle stick and you will see if everything is setup correctly.

FUNCTION	STATUS	MODE LED	SET LED
Neutral (automatic brake inactive)	--	off	blue
Neutral (automatic brake active)	--	red	off
Forward	partial throttle	yellow	off
Forward	full throttle	yellow	blue
Brake	partial brake	red	off
Brake	full brake	red	blue

7. MODE PROGRAMMING

All modes are available for brushless and brushed motors (speedo adapts automatically). The NOSRAM MATRIX EVOLUTION ISTC features 4 modes which enable you to adjust it to YOUR special requirements. The factory settings are shown in grey colour.

- How to get into „programming the modes" ➔ Press MODE button for 3 or more seconds.
- How to check the stored values ➔ Count the number of flashes of the blue SET-LED (1x = value 1, 2x = value 2, etc.).
- How to change the value ➔ Press SET button to increase value by one step.
- How to get to the next Mode ➔ Press MODE button once.
- How to leave the programming mode ➔ If you are in MODE.4, press the MODE button one more time
- Table of settings, values and modes: see below (grey-shaded values show „works default settings").

MODE.1 (SmartCell System):

MODE LED	Value 1	Value 2
Yellow	LiPo/NiMH Automatic	4-6cell NiMH Racing Mode

MODE.2 (XPS.2 Brushless Power Profiles): **only with connected Brushless motor**

MODE LED	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7	Value 8
Red	smooth Power: 1X	smooth Power: 2X	smooth Power: 3X	smooth Power: 4X	linear Power: 4X	linear Power: 5X	progressive Power: 5X	aggressive Power: 6X

Higher value means more overall power and more aggressive throttle response.

Team Tips: The following XPS.2 (Brushless) settings are the preferences from our teamdrivers:
- Touring Car: Bonded: 4-7 Sintered: 3-5
- 1/12: Bonded: 3-5 Sintered: 2-4
- Off-Road 2WD + Truck: Bonded: 1-2 Sintered: 1
- Off-Road 4WD: Bonded: 1-4 Sintered: 1-3

MODE.2 (PMS.2 Brushed Power Profiles): **only with connected Brushed motor**

MODE LED	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Red	smooth, low traction	very linear	linear, punch increasing	aggressive profile	very aggressive profile	super aggressive profile

Higher value means more overall power and more aggressive throttle response.

Team Tips: The following PMS.2 (Brushed) settings are the preferences from our teamdrivers:
- Touring Car: Brushed: 3-5
- 1/12: Brushed: 2-3
- 19/27T motors: Brushed: 5-6
- Off-Road 2WD + Truck: Brushed: 1-2
- Off-Road 4WD: Brushed: 1-4

MODE.3 (Initial Brake): Allows you to set a certain level of „hand-brake-effect".

MODE LED	Value 0	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Yellow/Red (alternate)	No Initial Brake	Going from lowest to highest inital brake setting (value 1 = minimum / value 6 = maximum)					

Team Tips: A good starting point for the brake setting on your radio is 80% (bonded) and 70% (sintered) for all classes. Make sure you do the radio-setup with all settings on the radio on 100%.

MODE.4 (Automatic Brake): Allows you to set a slight braking action in neutral range.

MODE LED	Value 0	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Yellow/Red (same time)	No Automatic Brake	Going from lowest to highest automatic brake setting (value 1 = minimum / value 6 = maximum)					

Team tips: For brushless motors you achieve the same natural slowdown as a brushed motor with no autobrake when you set value 2/3 (for bonded magnets) or 0/1 (for sintered magnets).

8. SPECIAL FEATURES

Smart-Temp-Readout-System: As a world-exclusive the NOSRAM MATRIX EVOLUTION ISTC allows you to read-out the maximum internal temperature that the speedo reached. To save it to the memory you have to briefly apply brakes after the run before you turn the switch off. You can convienenly read-out the temperature back in the pits since it remains stored until you turn it on the next time regularly (which will reset the memory). This new feature allows you to accurately check if all is running well or if you're close to shutdown already.
How to read-out the temperature:
- ➔ Switch at „OFF" position.
- ➔ Keep MODE button pressed while you turn switch to „ON" (then release button)
- ➔ SET LED will start to flash blue (MODE LED is off), now count the number of flashes.
  - Thermal shutdown of the speedo would occur at 5 flashes.
  - The higher the number of flashes, the cooler the speedo ran (e.g. the better it is!).
  - Every flash over 5 equals to ~8°C lower internal temp. (e.g. 10 flashes is 40°C below shutdown)

Launch Control: Well known and famous from our brushed speedos! Now also available for brushless, the launch control allows „rocket like" starts. After activation it gives you more power one time for the start (this feature is only recommended to be used with touring cars on high traction surfaces!).
How to activate launch control:
- ➔ Hold trigger of transmitter at full brake for 5sec before start. Ready and active!!!

SmartCell System: Ready for the next battery technology – LiPo batteries! NOSRAM's exclusive and smart SmartCell System ensures that LiPo batteries can be used safely without accidentially deep-discharging of the cells. The motor function will be shut-off and the SET LED will flash if the system recognises very low battery voltage.
Tip: We recommend using value 2 for 4-6 cells NiMH racing purposes, which disengages the LiPo protection.

XPS.2 Brushless - Power Profiles: An all new brushless technology which results in more power and better driveability. Depending on the status of the car (start, acceleration and full speed) the software calculates the perfect motor management. Higher value means more overall power and aggressive response.
Caution: Do not advance mechanical timing on the motor. Leave the motor timing on minimum timing, which equals to 2mm on the sticker.

PMS.2 Brushed - Power Profiles: The known and world's winning PMS.2 Brushed power programs have been implemented into the NOSRAM MATRIX EVOLUTION ISTC aswell. Higher value means more overall power and aggressive response.

Automatic Brushless / Brushed Adaption: The NOSRAM exclusive Automatic Brushless/ Brushed Adaptation detects the connected motor type during turn-on/initialisation and adjusts the correct brushless or brushed operation automatically. No adjustments required by yourself, apart from the correct connection of each motor type (don't forget the hall-sensor-wire for brushless!).
Caution: Keep in mind, when swopping between brushless and brushed motors, that the chosen mode values will be identical!

Changing Mode settings without the transmitter: At race events you usually do not have access to your transmitter, but never mind since you can simply disconnect the receiver lead from the receiver and change the MODE settings as described in section 7 „Mode Programming".

Works-Default-Settings: All NOSRAM speed-controls come factory-adjusted (defaults are grey-shaded above). If you loose track of the modes, you can restore the works default settings. With the transmitter switched on, hold the SET button pressed while you switch on the speed-control. This simple action returns the unit to the NOSRAM works default settings.

Power Capacitor: Never disconnect the power-capacitor! It offers increased punch and additional protection.

FreezeDrive Design: NOSRAM's secret FreezeDrive Design results in lower speedo temperature under all racing conditions and for both brushless + brushed. Sorry, no further details to be disclosed. Simply a step ahead of the competition!

Forward/Brake: Uncompromising and outstanding performance for top level competition was the target! Therefore the NOSRAM engineering team developed a pure forward/brake competition speed-control without reverse function.

Sensored Brushless Technology: Enhanced Digital allows the perfect knowledge of the brushless motor's magnet position. This results in perfect motor control at high and low RPM's, as well as perfect brake control.

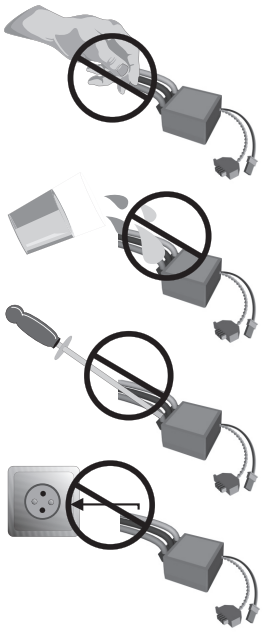
Multi-Protection System, 3-way protection: The perfect protection against short-circuits (motor), overload and overheating. If your speed-control faces overload, the motor function will be shut-off for protection and the SET LED will flash, although the steering function is maintained. Let the speed-control cool down for a few minutes. If you experience frequent shutdowns, check for the following:
- Correct gear ratio (refer to motor manual for gearing recommendations)
- XPS.2 setting too high (higher value will heat up motor and speed-control excessively)
- Motor is too strong or motor is damaged.

9. WARNING NOTES

No toy. Not suitable for children under 14 years.

Keep the product out of the reach of children.

Pay close attention to the following points, as they can destroy the product and void your warranty. Non-observance of these points can lead to property damage, personal and severe injuries!



- Never leave the product unsupervised while it is switched on, in use or connected with a power source. If a defect occurs, it could set fire to the product or the surroundings.
- Never wrap your product in plastic film, metal foil or similar. In fact, make sure it gets enough fresh air.
- Avoid incorrect connections or connections with reversed polarity of the product.
- All wires and connections have to be well insulated. Short-circuits can possibly destroy the product.
- Never allow this product or other electronic components to come in contact with water, oil or fuels or other electroconductive liquids, as these could contain minerals, which are harmful for electronic circuits. If this happens, stop the use of your product immediately and let it dry carefully.
- Never cut off or modify the original plugs and original wires.
- Never open the product and never solder on the PCB or other components.
- Never use this product when the case is open, damaged or missing or when the product is wrapped in a shrink-fit tube. This will reduce protection, may cause short circuits and damage the product.
- Always remove the battery from your product or disconnect the product from the power source, if the product is not in use.
- Always switch on your transmitter first before you switch on the receiver or the speed control. The receiver could receive interference signals, start full acceleration and damage your model. When you switch off, make sure you do so in the reverse sequence. First switch off the receiver and speed control, then switch off the transmitter.
- Never solder a Schottky diode to the motor when you are using this speed-control.
- If the speed-control is connected to the motor, never run the motor directly with a separate battery or run-in device.
- Never change the polarity of the receiver connector.
- Always wire up all the parts of the equipment carefully. If any of the connections come loose as a result of vibration, you could loose control over your model.
- Avoid soldering longer then 5 seconds per soldering joint when replacing the power wires to prevent possible damage to the product due to overheating of the components. Use a high power soldering station for soldering.
- Never apply full throttle if the motor is not installed. Due to the extremely high RPMs without load, the motor can get damaged.

10. TROUBLESHOOTING GUIDE

EXPLANATION: If no remark, cause can be either with brushless or brushed motor. If „BM“ is indicated, cause only relating to brushed motor.

SYMPTOM	CAUSE	REMEDY
Servo is working, no motor function.	Speed-control plugged in incorrectly	Plug speed-control in Ch 2
	Overload protection activated	Allow speed-control to cool down
	Wiring problem	Check wires and plugs
	Motor defective	Replace motor
	BM - Motor brushes stuck	Check that brushes are moving freely
	Speed-control defective	Send in product for repair
No servo and no motor function.	Speed-control plugged in incorrectly	Plug speed-control in with correct polarity
	Crystal defective	Replace components one by one.
	Receiver defective	
	Transmitter defective	
	Speed-control defective	Send in product for repair
Motor runs in reverse when accelerating forward on the transmitter.	*BM* - Motor connected incorrectly	Connect motor correctly
Insufficient performance. E.g. poor brake power, topspeed or acceleration..	Motor pinion too big or gear ratio too long.	Use smaller motor pinion/shorter gear ratio
	Transmitter settings changed after set-up	Repeat set-up procedure
	BM - Motor worn out	Maintain motor
	Motor defective	Replace motor
	Speed-control defective.	Send in product for repair
Speed-control overheats or switches off frequently.	Motor stronger than motorlimit or input voltage too high	Use only motors and batteries which are within the specifications of the speed-control
	Motor pinion too big or gear ratio too long.	Use smaller motor pinion/shorter gear ratio
	Drive train or bearing problems.	Check or replace components.
	Model used too often without cool-down periods	Let speed-control cool down after every run
Motor never stops, runs at constant slow speed	Transmitter settings changed after set-up	Repeat set-up procedure
	Humidity/water in speed-control	Immediately unplug and dry speed-control
	Speed-control defective	Send in product for repair
Radio interference	*BM* - Motor suppressors not sufficient	Solder capacitors to motor
	Receiver or antenna too close to power wires, motor, battery or speed-control. Receiver aerial too short or coiled up	See „Installation Tips“ and „Installation“
	Receiver defective, too sensitive; Transmitter defective, transmitter output power too low, servo problem	Replace components one by one Only use original manufacturers crystals
	Poor battery connection	Check plugs and connecting wires
	Transmitter batteries empty	Replace / recharge transmitter batteries
	Transmitter antenna too short	Pull out antenna to full length

The crossed-out wheeled bin means that within the European Union the product must be taken to seperate collection at the product end-of-life. Do not dispose of these products as unsorted municipal waste.

REPAIR PROCEDURES / LIMITED WARRANTY

All products from NOSRAM are manufactured according to the highest quality standards. NOSRAM guarantees this product to be free from defects in materials or workmanship for 90 days (non-european countris only) from the original date of purchase verified by sales receipt. This limited warranty doesn't cover defects, which are a result of normal wear, misuse or improper maintenance. This applies among other things on:

- Cut off original power plug or not using reverse polarity protected plugs
- Receiver wire and/or switch wire damaged
- Mechanical damage of the case
- Humidity/Water inside the speed control
- Mechanical damage of electronical components/PCB
- Soldered on the PCB (except on external solder-tabs)
- Connected speed-control with reversed polarity

To eliminate all other possibilities or improper handling, first check all other components and the trouble shooting guide, if available, before you send in this product for repair or warranty. Products sent in for repair, that operate perfect have to be charged with a service fee.

By sending in this product, you assign NOSRAM to repair the product, if it is no warranty or Limited Lifetime Warranty case. The original sales receipt including date of purchase needs to be included. Otherwise, no warranty can be granted. For quick repair- and return service, add your address and detailed description of the malfunction.

Because we don't have control over the installation or use of this product, we can't accept any liability for any damages resulting from using this product. Therefore using this product is at owner's risk. Our limited warranty liability shall be limited to repairing the unit to our original specifications. In no case shall our liability exceed the original cost of the unit. By installing or operating this product, the user accepts all resulting liability.

The specifications like weight, size and others should be seen as guide values. Due to ongoing technical improvements, which are done in the interest of the product, NOSRAM does not take any responsibility for the accuracy of these specs.

With Limited Lifetime Warranty products, the warranty terms on the Limited Lifetime Warranty card do also apply.

NOSRAM-Distributor-Service:

- Package your product carefully and include sales receipt and detailed description of malfunction.
- Send parcel to your national NOSRAM distributor.
- Distributor repairs or exchanges the product.
- Shipment back to you usually by COD (cash on delivery), but this is subject to your national NOSRAM distributor's general policy.